Postal Regulatory Commission
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Seasonal Increases in US Postal Service Costs Driven by Competitive Products

Presentation to Postal Regulatory Commission for Technical Conference
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Agenda

Presentation of the Analysis

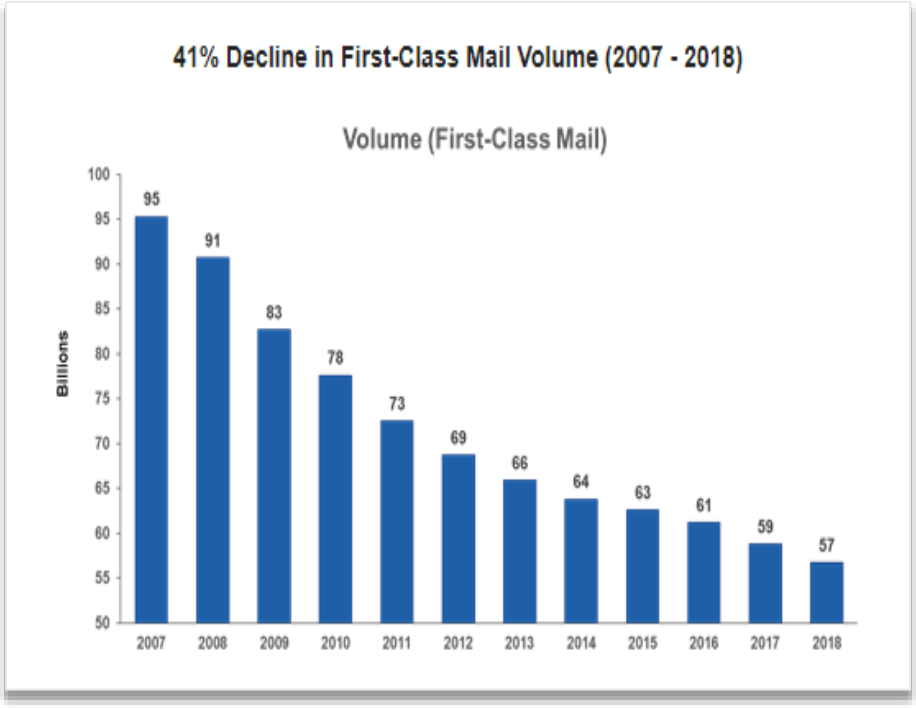
- Objectives
- Methods and Results
- Solutions

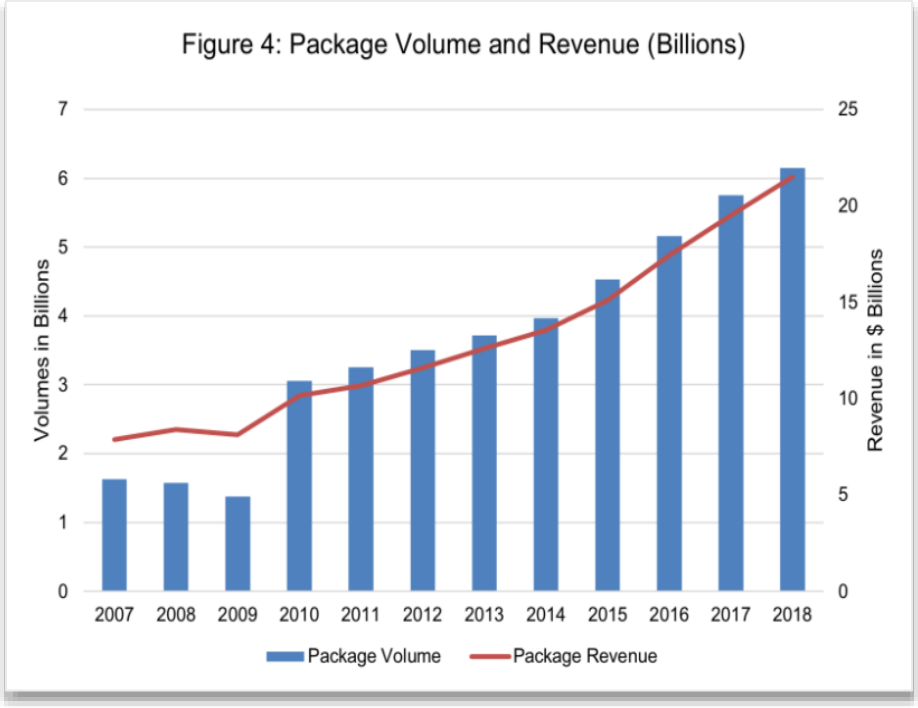
The Commission's Requested Topics

- How the variability costing models, if modified, would be used consistently during both peak- and off-peak time periods
- How the attribution methodology, if modified, would ensure that the costs are attributed to products (or groups of products) through reliably identified causal relationships, as required by 39 U.S.C. 3622(c)(2)

Objectives

- **Assess Costing Models in Light of the Changing Nature of the Postal Service's Business and the Importance of Incremental Costs**





Packages Peak in the December Holiday Season

Peak Package Season Prep

Nov
28
2016

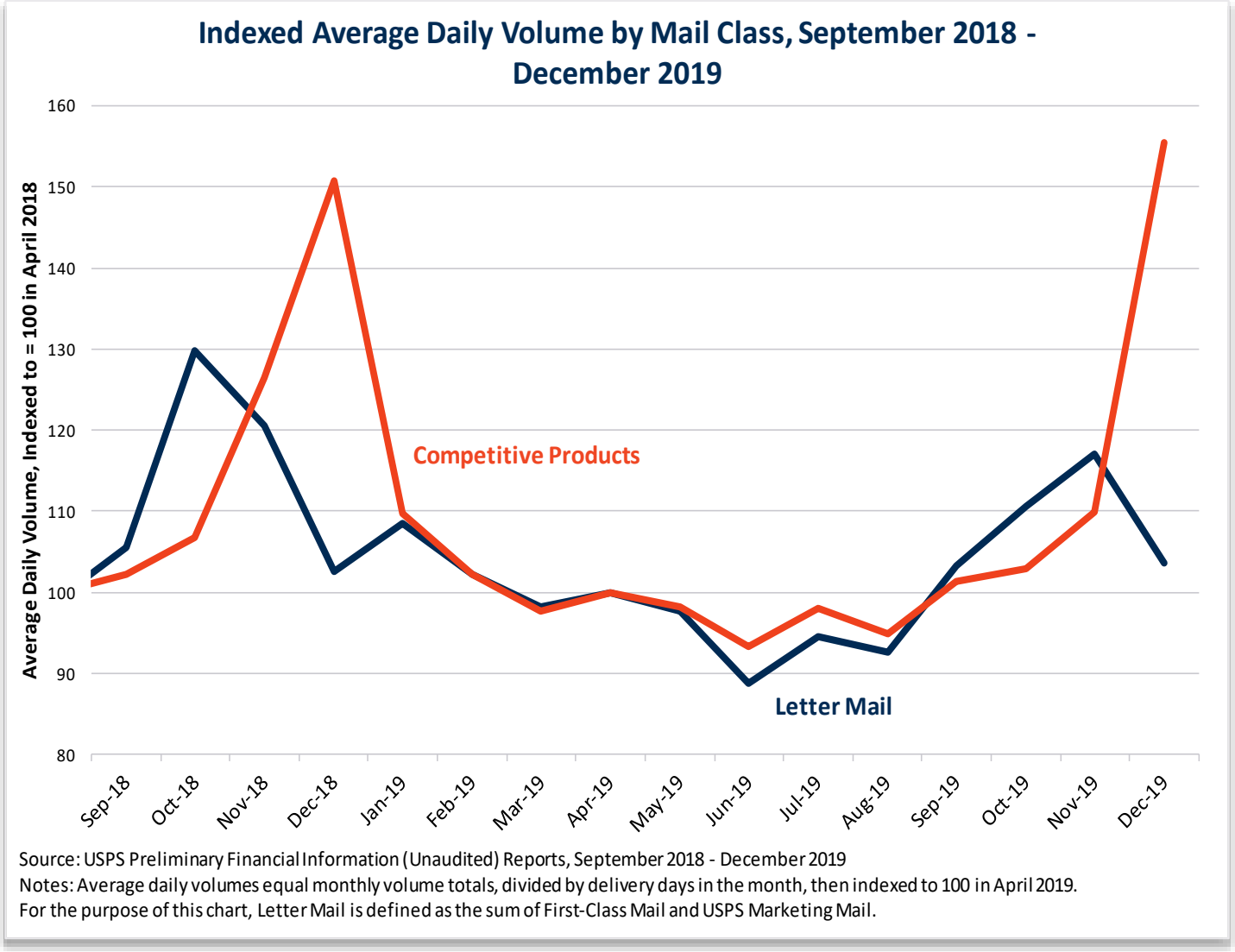
OIG Blog Category: Delivery & Collection 14 Comments

Another holiday season, another massive surge in package volume. This year will be bigger than the last – which was a record-breaking year. It may be an understatement to say the dramatic growth in online shopping continues unabated.

Not surprising, then, that the U.S. Postal Service is projecting a double-digit increase in package volume this holiday season. UPS expects to deliver a record 700 million packages between Thanksgiving and December 31, an increase of more than 16 percent. FedEx is also projecting a record-breaking year, with volume about 10 percent higher than last year, totaling roughly 370 million packages.

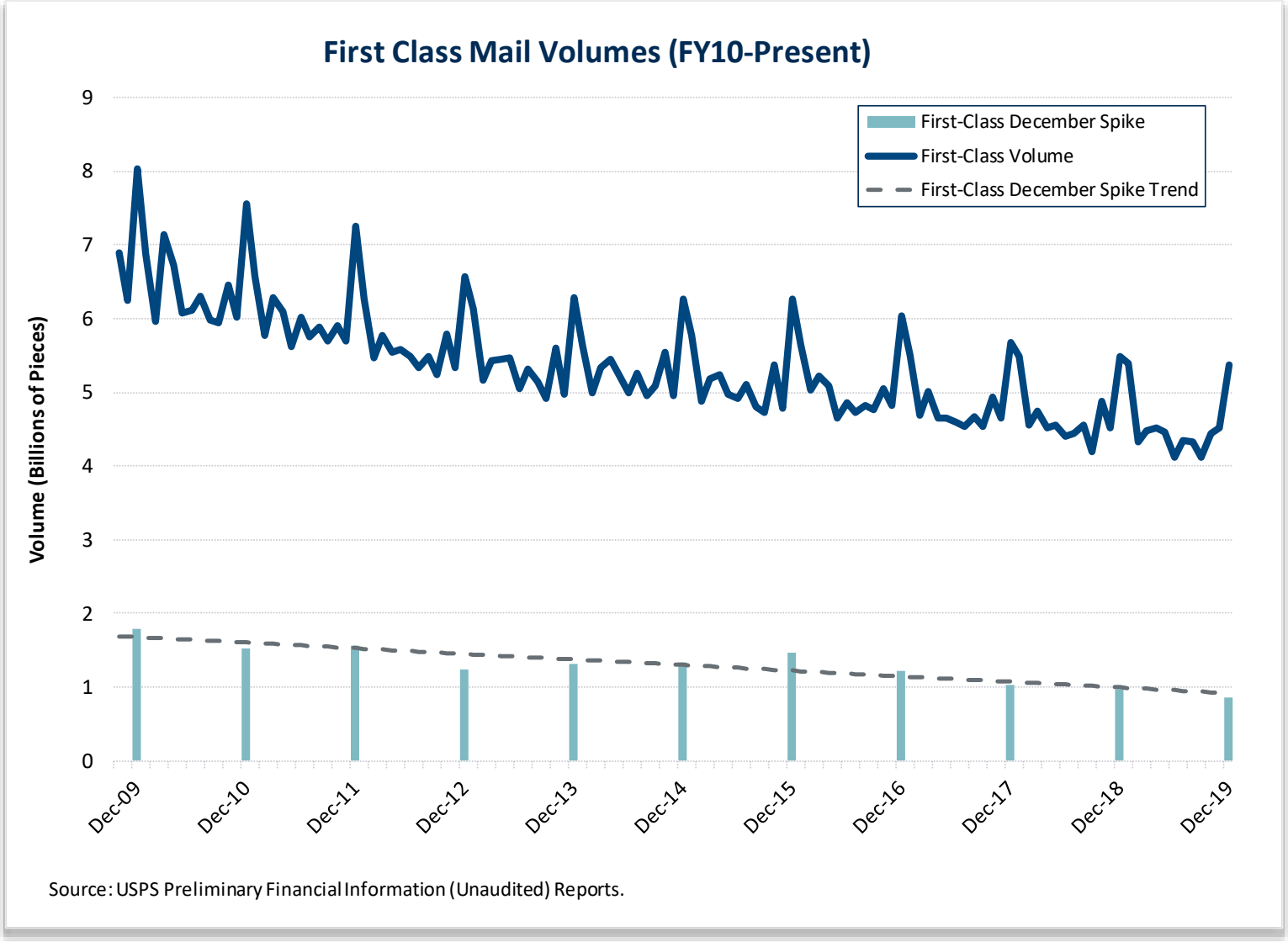
Peak Package Season Prep, U.S. Postal Serv. Off. of the Inspector Gen., https://www.uspsoig.gov/blog/peak-package-season-prep (Nov. 28, 2016).

Competitive Product Volumes Increase Sharply in December, While Overall Market Dominant Volumes Decline



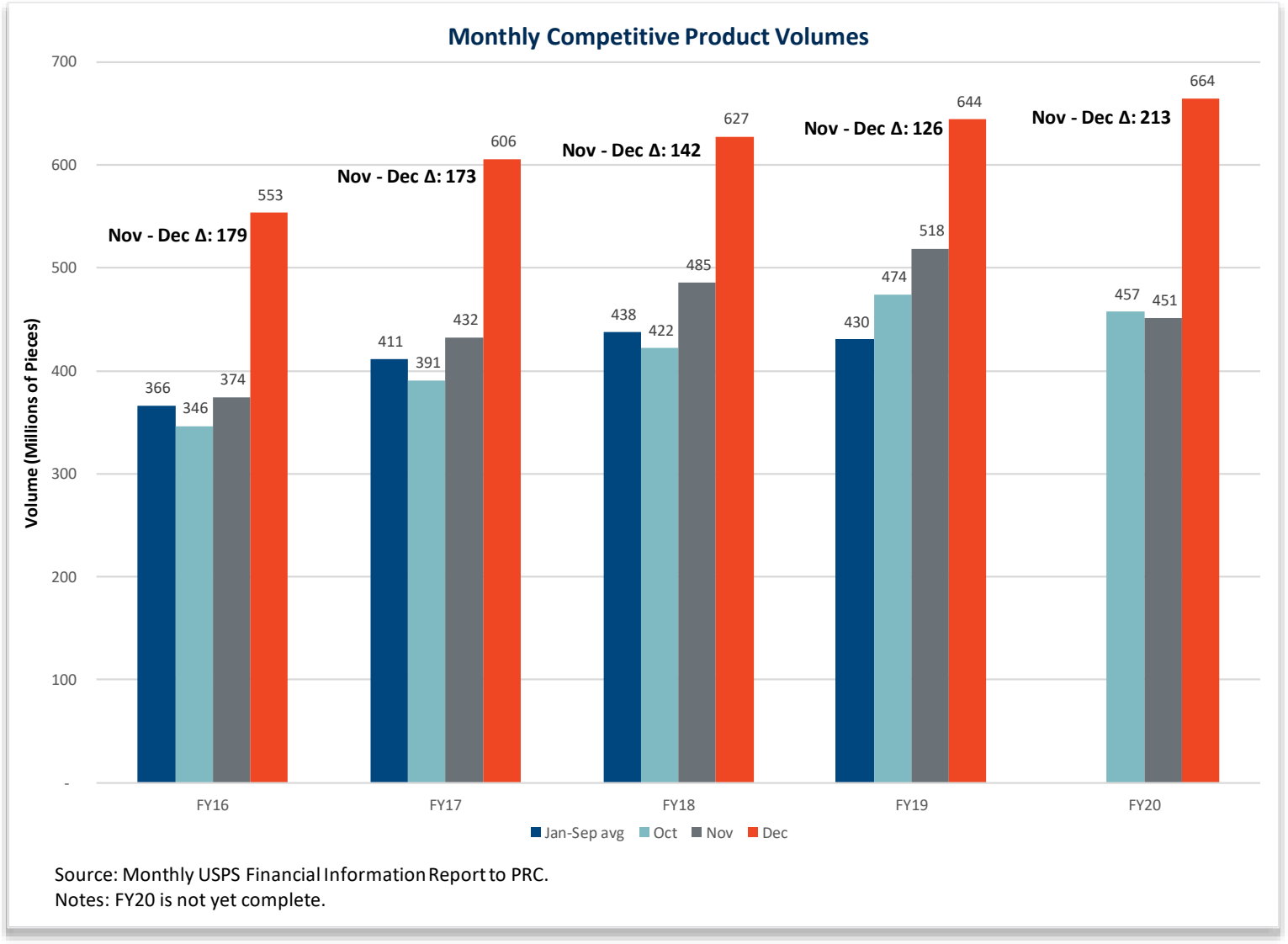
Source: USPS Preliminary Financial Information (Unaudited) Reports, September 2018 - December 2019
Notes: Average daily volumes equal monthly volume totals, divided by delivery days in the month, then indexed to 100 in April 2019.
For the purpose of this chart, Letter Mail is defined as the sum of First-Class Mail and USPS Marketing Mail.

The Contribution of First-Class Mail to the December Cost Spike Is Dwindling



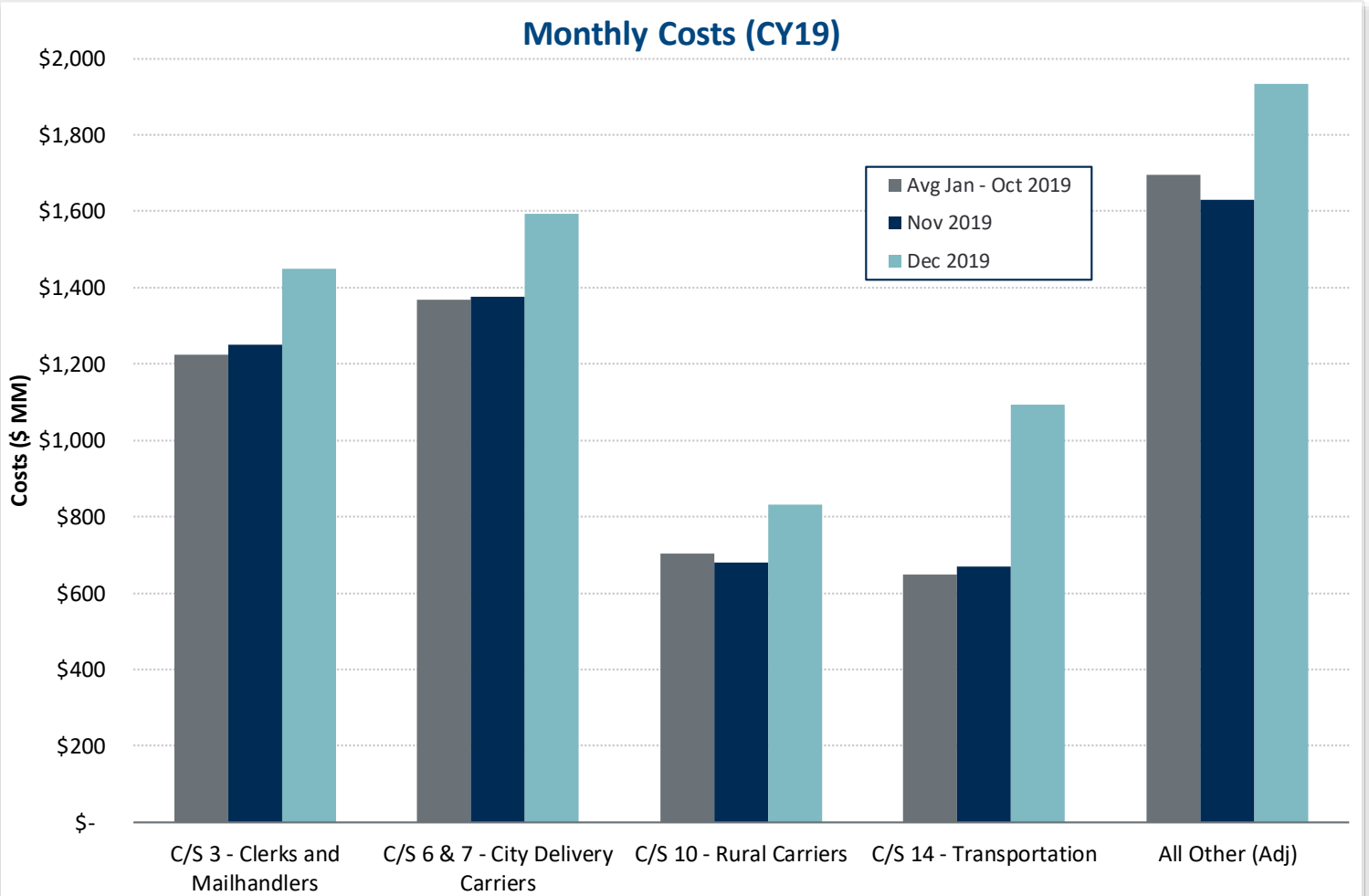
Source: USPS Preliminary Financial Information (Unaudited) Reports.

The December Competitive Product Volume Peak Occurs Every Year



Source: Monthly USPS Financial Information Report to PRC.
Notes: FY20 is not yet complete.

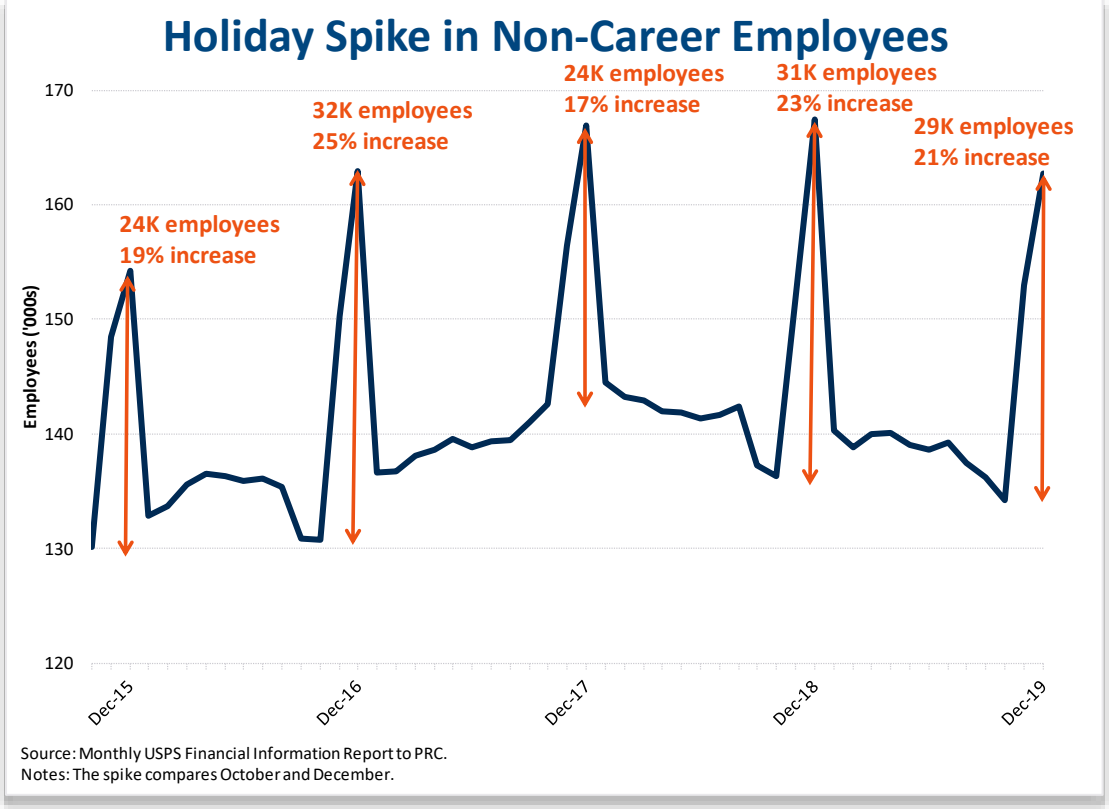
All Major Cost Categories Increase Substantially in December



Source: Monthly Trial Balances (Jan 2019 - Dec 2019). "All Other (Adj)" excludes Civil Service Retirement Supplemental Liability (C/S 18.3.3), Workers Compensation (C/S 18.3.4), Annuitant Health Benefits (C/S 18.3.6), and FERS Supplemental Liability (C/S 18.3.7) costs from the "National Trial Balance Reports."

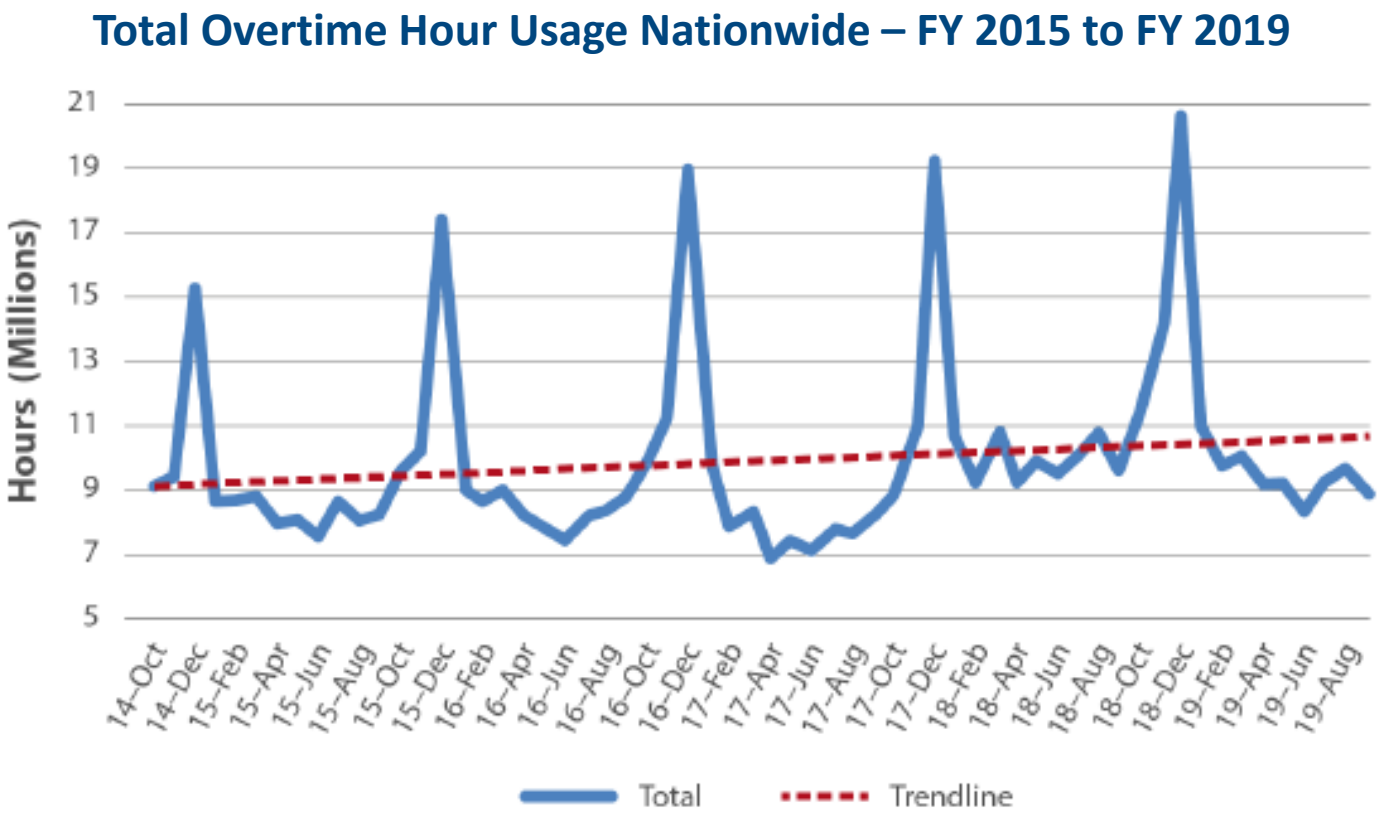
What Drives Increased Costs in Peak Season?

Temporary measures taken to accommodate volume spikes



What Drives Increased Costs in Peak Season? (cont.)

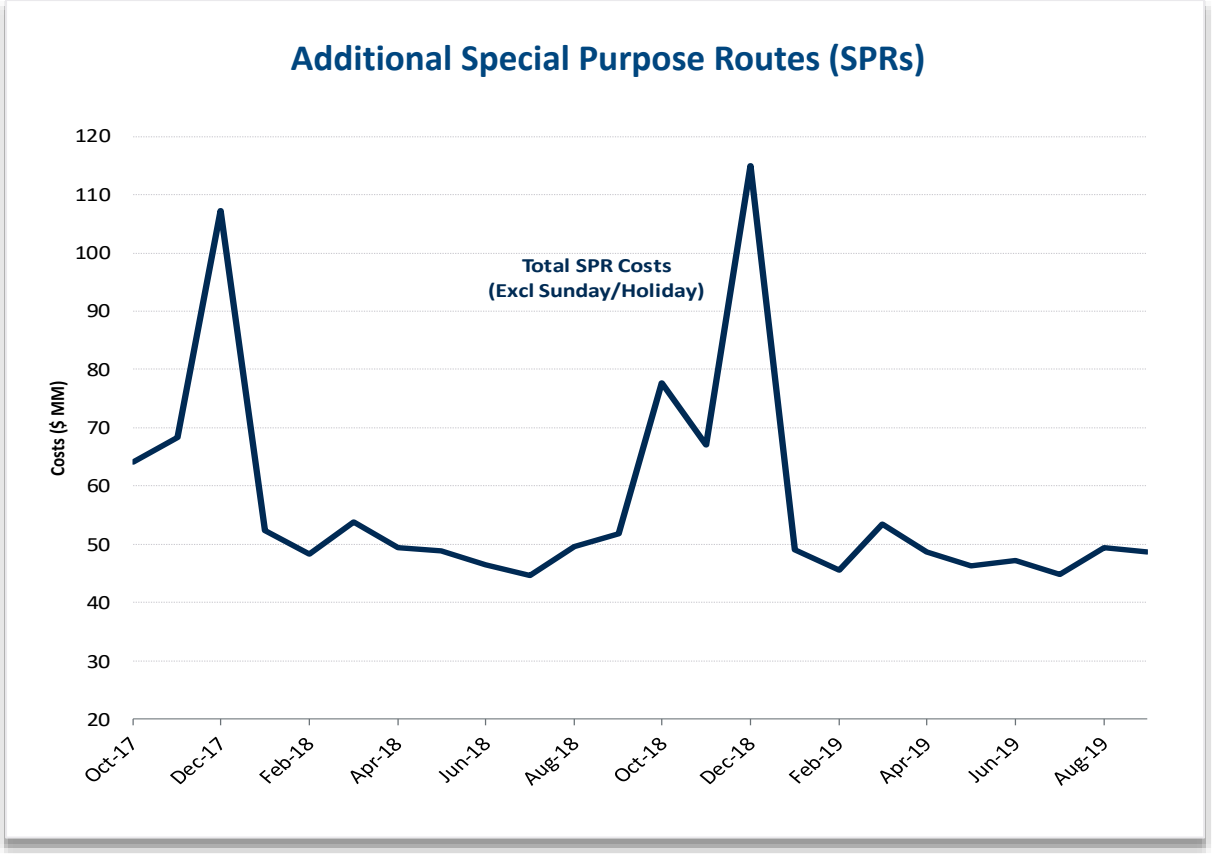
Large spikes in overtime



Source: USPS-OIG Report 20-209-R20 (August 2020)

What Drives Increased Costs in Peak Season? (cont.)

More Special Purpose Routes focused on package deliveries



Our Methodology

- Peak Season provides a **natural experiment** to test whether incremental competitive product costs are captured or not.
- Using Postal Service costing models, we calculate an average cost per piece at the product and mail class level.
- We apply the class-level unit cost estimates to class-level monthly volume counts to predict how costs should change from November to December.
- We compare these *predicted* cost increases to the *actual* cost increases.

Technical Details

Notation:

- Upper case letters refer to annual totals, lower case to monthly values.
- *A* represents volume variable and product specific costs.
- *c* represents total costs.
- *V*, *v* represent volume.
- *n* represents November, *d* represents December.
- *j* indexes cost categories (clerks, delivery, transportation, other), *k* indexes mail classes.

u_j, the unexplained December cost increase for cost category *j* is then given by:

$$u_j = (c_{jd} - c_{jn}) - \sum_k \frac{A_{jk}}{V_{jk}} (v_{kd} - v_{kn})$$

Postal Service Costing Models Explain Less Than 50% of the Nov-Dec Cost Spike

- Delivery costs in particular rise much more than costing models predict.
- These unexplained costs are *not* attributed to competitive products.
- Large shares of these costs are treated as institutional, but are *not* accounted for under the "appropriate share" requirement either.

Analysis of FY19 Cost Increase (in Millions of $)

	Actual Nov-to-Dec Cost Increase [1]	Cost Increase Implied by Changes in Market Dominant Volume [2]	Cost Increase Implied by Competitive Product Volume Increases [3]	Total Cost Increase Implied by Current Costing Models [4]	Unexplained Cost Increase [5]
Clerks (C/S 3)	$ 186	$ (3)	$ 92	$ 89	$ 96
Delivery (C/S 6, 7, 10)	$ 285	$ (76)	$ 55	$ (21)	$ 306
Transportation (C/S 14)	$ 221	$ 34	$ 83	$ 117	$ 105
Other	$ (74)	$ (16)	$ 70	$ 54	$ (128)
Total	**$ 618**	**$ (61)**	**$ 300**	**$ 239**	**$ 379**

Sources: Monthly Trial Balances, USPS Preliminary Financial Information reports, Cost Segments and Components Report.

Notes:

Other excludes Annuitant Health Benefits & Earned CSRS Pensions (C/S 18.3.6), Workers Compensation (C/S 18.3.4), and FERS Supplemental Liability (C/S 18.3.7), and Civil Service Retirement Supplemental Liability (C/S 18.3.3)

[1]: Difference between November and December FY2019 monthly trial balance totals.

[2], [3]: Calculated by multiplying the estimated November-to-December change in volume for a given mail class by that class's annual average attributable cost per piece, and then summing across all products. For competitive products, only public information was used.

[4]: [2] + [3].

[5]: [1] - [4].

This Unexplained November-to-December Spike Recurs Year after Year

Unexplained November-to-December Cost Increases, FY16-FY20

Fiscal Year	Actual Nov-to-Dec Cost Increase [1]	Cost Increase Implied by Changes in Market Dominant Volume [2]	Cost Increase Implied by Competitive Product Volume Increases [3]	Total Cost Increase Implied by Current Costing Models [4]	Unexplained Cost Increase [5]
2016	$ 1,116	$ 190	$ 401	$ 592	$ 524
2017	$ 1,020	$ 64	$ 374	$ 438	$ 582
2018	$ 836	$ (22)	$ 329	$ 307	$ 529
2019	$ 618	$ (61)	$ 300	$ 239	$ 379
2020 (Preliminary)	$ 1,297	$ (11)	$ 520	$ 509	$ 788
Average	**$ 977**	**$ 32**	**$ 385**	**$ 417**	**$ 560**

Sources: Monthly Trial Balances, USPS Preliminary Financial Information reports, Cost Segments and Components Report.

Notes:

Costs exclude Annuitant Health Benefits & Earned CSRS Pensions (C/S 18.3.6), Workers Compensation (C/S 18.3.4), and FERS Supplemental Liability (C/S 18.3.7), and Civil Service Retirement Supplemental Liability (C/S 18.3.3)

[1]: Difference between November and December monthly trial balance totals

[2], [3]: Calculated by multiplying the estimated November-to-December change in volume for a given product by that product's average volume variable cost per piece, and then summing across all products. For FY2020, FY2019 attributable cost per piece is used after applying an assumed rate of inflation of 2.2% based on expected hourly compensation from USPS's FY2020 Integrated Financial Plans.

[4]: [2] + [3].

[5]: [1] - [4].

What Drives the Unexplained Cost Spike?

1. **December-specific cost increases**:
   - the system is strained, and as a result the effective **unit costs are higher** in December than in other months

2. **Systematic under-costing of competitive products:**
   - **year-round** under-costing of competitive products becomes more visible when package volumes spike

In both cases, the current methodology contributes to what appears to be a pervasive problem

Peak Season Cost Increases Are Incremental Costs

- The Postal Service's actions to resize the network and increase capacity to accommodate seasonal peaks in volume are **incremental costs** of competitive products.

- Such costs would go away if the Postal Service did not deliver competitive products.

  - **Would 30,000 non-career employees be hired every peak season if not for competitive products? *No.***

- But the Postal Service models do not identify all costs that would go away if it did not deliver packages — either in December or overall.

An Example: City Carrier (Cost Segments 6 and 7)

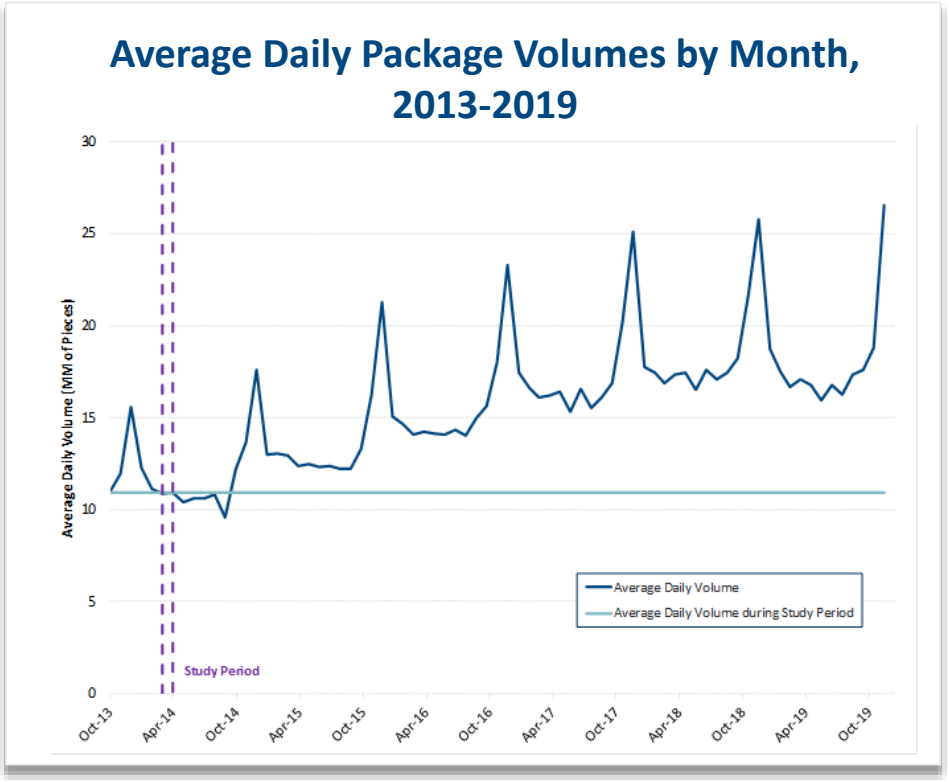
They Don't Drive Sleighs, but Carriers Deliver Welcomed Packages at Holidays, **Trib.-Star (Dec. 21, 2019), ("Letter carrier [] totes a few of the 28 million packages the United States Postal Service expects to deliver daily nationwide during the week before Christmas.").**

Five different flaws contribute to missing peak season costs

1. Reliance on Special Studies that Ignore Peak Season

Dataset for model *systematically ignores* peak season.

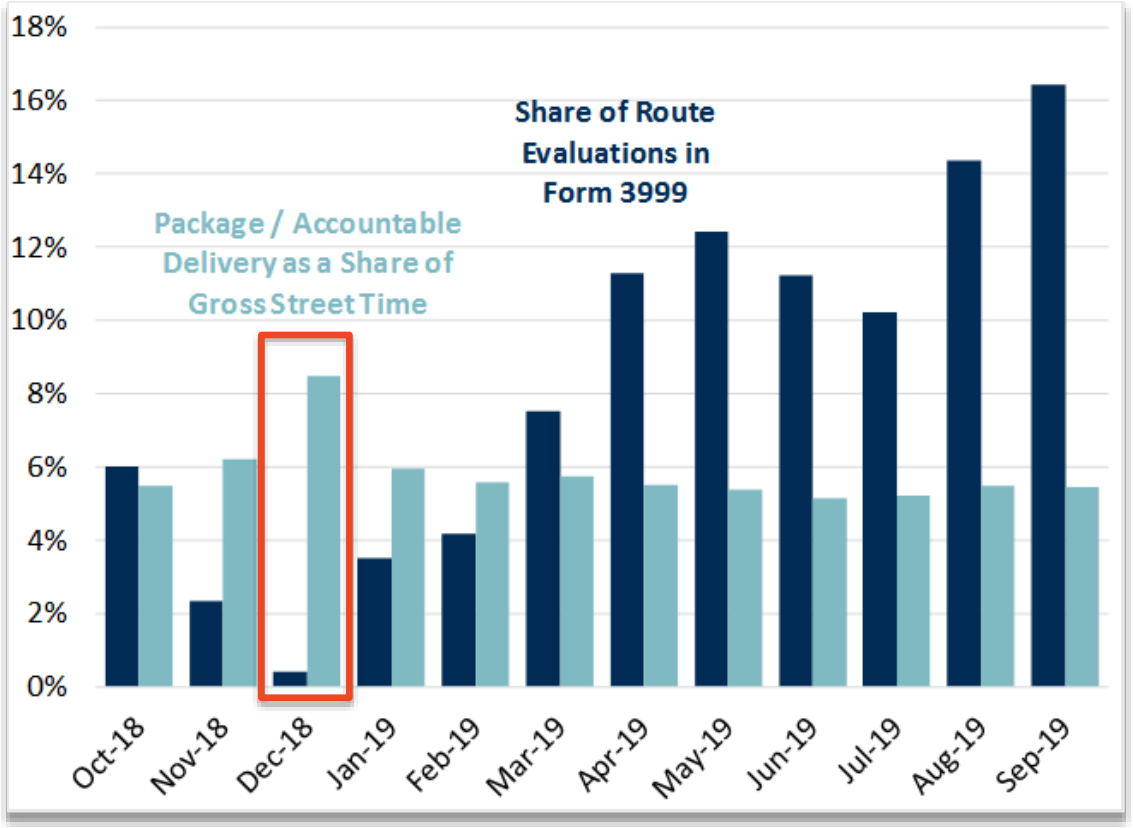
- Special studies cover 12 days in spring of 2013 (collection mail) and 13 days in spring of 2014 (packages and accountables).



- This special study determines **variability** — the share of costs that get attributed to products.
- December was not included

2. Failure to Collect Data During Peak Periods

Costing Model separates costs into pools based on Form 3999 route evaluations that *systematically avoid* peak season.

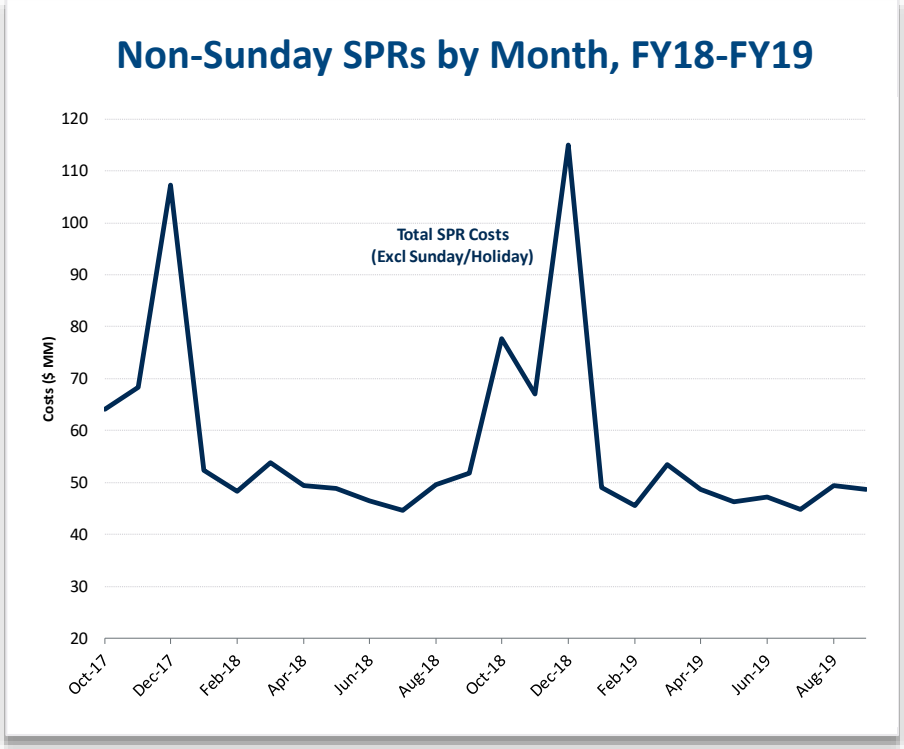


- December, the month with the **highest package workload,** has **the fewest route evaluations** (less than 1%)

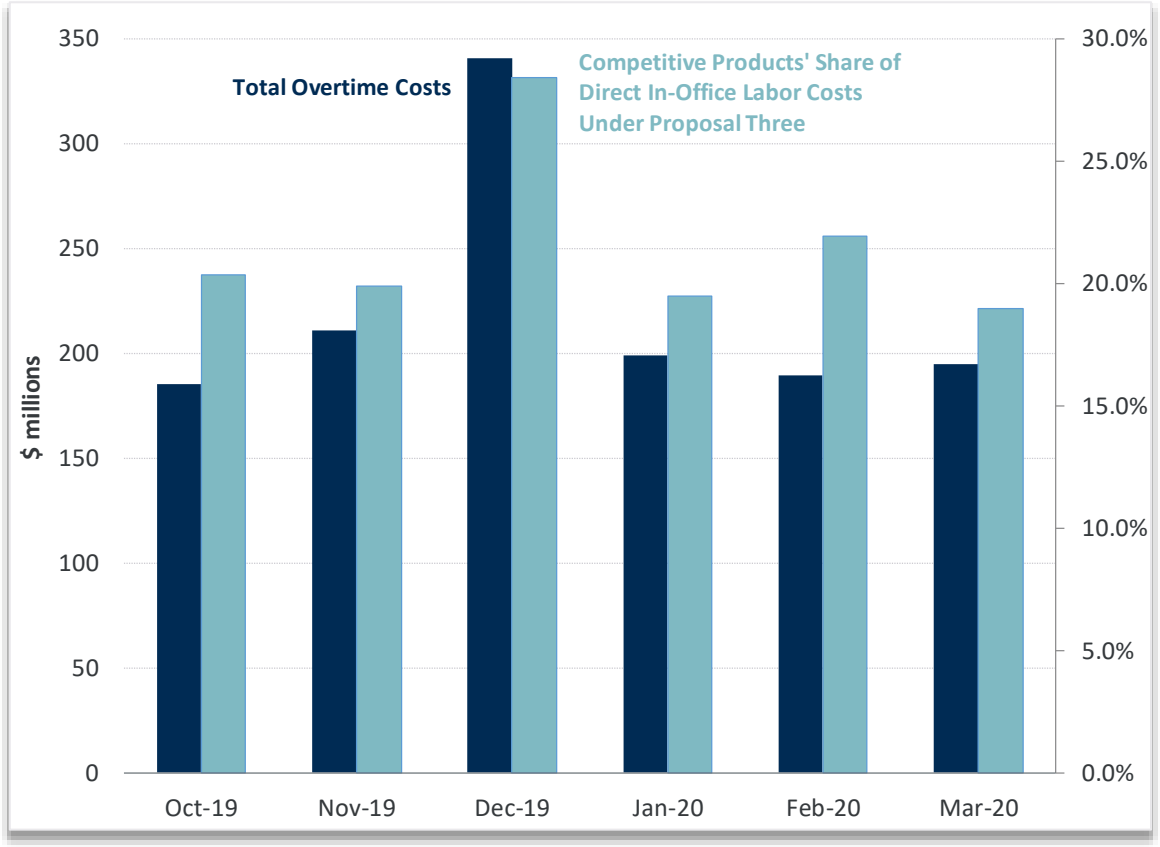
3. Failure to Capture and Attribute Start-Up Costs

Many "start-up costs" to accommodate peak season are treated as institutional

- SPRs increase substantially between non-peak months and December.
- ~30,000 seasonal hires (broader than city carrier)
- When portions of these volume-driven costs are treated as institutional they **are shifted in large part to market dominant products.**



4. Failure to Capture Seasonal Input Price Variation



- **City carrier overtime costs** become more prevalent in December, when **packages' share of in-office labor costs** are highest
- But the IOCS cost model samples and allocates *hours*, without accounting for differences in overtime

5. Year-Round Flaws Become More Visible

Costing Model assumes that package delivery activities are *fully separable* from regular delivery activities.

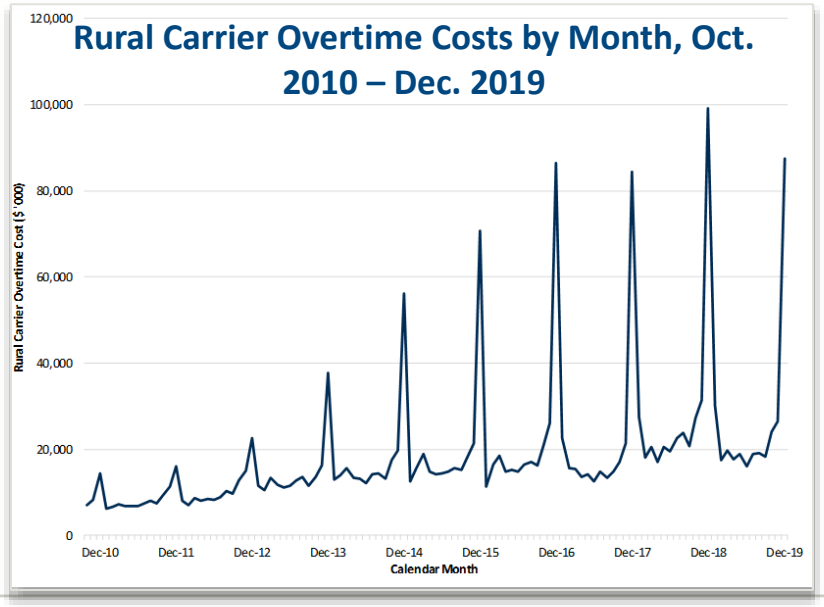
- This assumption is unrealistic at current volumes
- Preliminary results in docket PI2017-1 indicate that relaxing this assumption results in much higher cost attribution for competitive products — by as much as *$325M/year* (using 2016 data)
- These results confirm that packages have impacts on carrier time that greatly exceed those implied by current costing procedures
- Such impacts are exacerbated in December

Similar Problems Arise Across the Enterprise

Rural Carrier Examples

- Variabilities and the distribution of VVC are determined during 12 days in *February* and *March* **(reliance on special studies)**
  - This affects the share of *year-round* costs that get attributed *and*
  - The share of *year-round* costs attributed to flats, parcels, DPS, etc.

- Unclear when RCCS (distribution key) data are collected **(failure to collect data during peak season)**



Mail Processing (C/S 3) and Transportation (C/S 14) provide further examples

SOLUTIONS

Technical Adjustment to Existing Models

Adjustments to costing models would mitigate (but not solve) some issues described here. Some examples:

1. Accelerate development of top-down model in city carrier
2. In the meantime, adjust the letter route cost pool formation process such that December costs are truly reflected
3. Adjust (several) sampling processes such that
   - Costs are correctly measured, rather than hours
   - Adopt monthly control weights (as opposed to quarterly) to ensure that the mail mix during the highest-cost time of the year is not under-represented
4. SPRs — econometric fix to better account for start-up costs in peak season
5. Changes to RCCS or RMC could allow for more accurate variabilities and mailstream allocation.

These adjustments could take many years.

More Detailed Operational Data Would Provide Further Insight

1. **Operational data collected in the course of business.**
   - Monthly product-level volumes, including a disaggregation of those volumes by delivery by city carriers on letter routes, by city carriers on SPRs, and by rural carriers
   - Monthly mailstream volumes (DPS, FSS, in-receptacle parcels, etc.), broken down by city carrier letter routes, city carrier SPRs, and rural carrier routes
   - Microdata from the CCCS, the CCCS-SPR, the RCCS, IOCS, TACS, MODS, SEAM, and TRACS, with product-level detail and time stamps intact where applicable
   - Monthly cost totals for SPR and Letter Route costs
2. **Additional data relating to changes in operations by month.**
   - Descriptive information and data on opening or closing facilities, hiring temporary workers, setting up temporary annexes, adding new categories of mail processing equipment, signing new contracts for temporary (i.e., "Christmas") highway transportation routes, etc.

Attribute Missing Peak Season Costs to Packages Using Best Available Methods

39 U.S.C. § 3633 (a)(1):

The ***unexplained cost spike*** identified through this study should be added to the subsidy test under (a)(1) because these costs are incremental to competitive products as a group

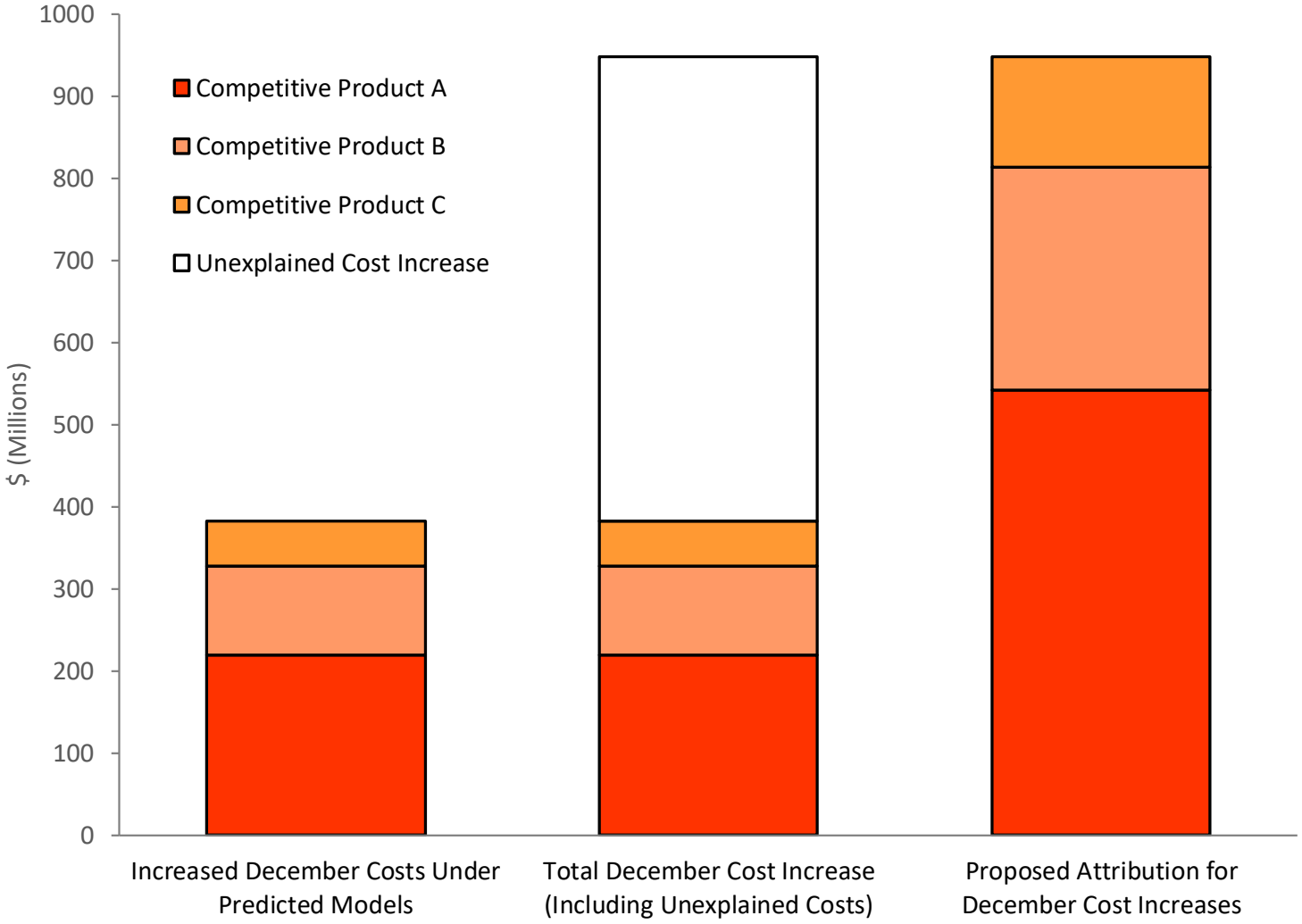
(a)(2):

Until a new incremental framework can be deployed, the Commission should attribute the unexplained peak season costs on ***a pro rata basis*** to ensure these costs are paid for by the proper products

(a)(3):

All peak season costs should be accounted for when setting the new "***appropriate share***"

Illustration of Pro Rata Attribution Proposal



Implementation of Attribution Proposal

Notation (as on slide 12, unless otherwise specified):

- *A* denotes annual attributable costs
- Let u_j denote the unexplained cost spike as defined on Slide 12
- *m* indexes components or sub–components of the cost categories included in the seasonal cost analysis
- F_m is an indicator variable that takes a value of 0 if there are no competitive product attributable costs in sub-component *m*, and 1 otherwise.
- *k* indexes mail classes
- *i* indexes individual products.
- D_i is an indicator variable taking a value of 1 if product *i* is a competitive product, and zero otherwise.
- $\lambda_{jm} = \frac{F_m(C_m - A_m)}{\sum_{m \in j} F_m(C_m - A_m)}$ gives sub-component *m*'s share of total institutional costs in sub-components with at least some competitive product presence in cost component *m*.
- Let $\gamma_{jm} = \frac{u_j \lambda_{jm}}{\sum_i D_i A_{mi}}$
- The portion of the unexplained cost increase assigned to sub-component *m* is given by $u_j \lambda_{jm}$. γ_{jm} is the amount by which the attributable costs for competitive product i in sub-component m must be increased to accomplish this.
- Under the pro rata proposal, adjusted attributable costs for cost category *m* and product *i* is given by $T'_{mi} = T_{mi}(1 + \gamma_{jm} D_i)$

Commission Topics

How the variability costing models, if modified, would be used consistently during both peak- and off-peak time periods

How the attribution methodology, if modified, would ensure that the costs are attributed to products (or groups of products) through reliably identified causal relationships, as required by 39 U.S.C. § 3622(c)(2)

Compliance with 39 U.S.C. § 3622 & 3652

Pro rata attribution will "improve the quality, accuracy, or completeness" of cost attribution.

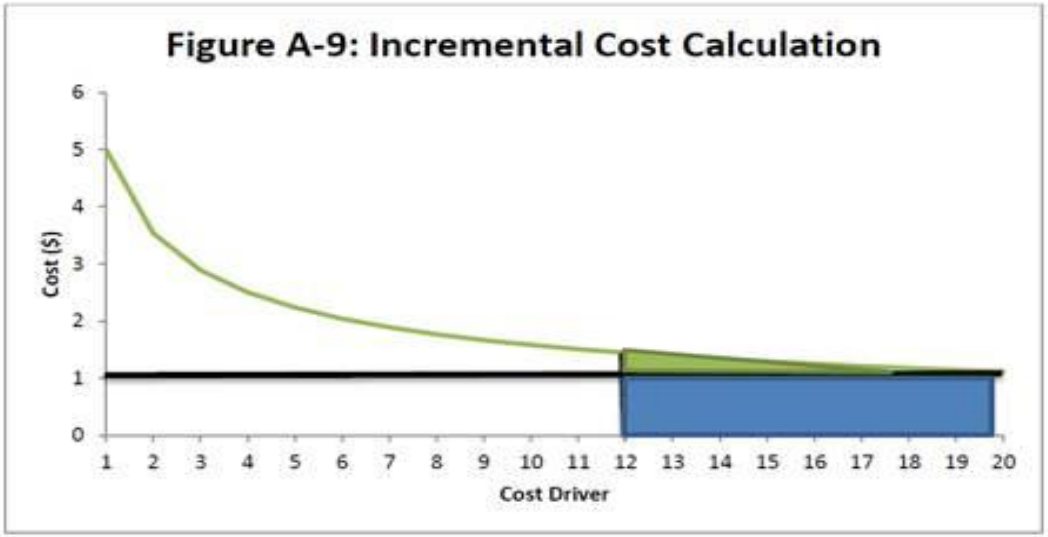
- The natural experiment of package peak season shows that existing costing models are missing incremental costs of package deliveries.
- The Commission has found that "incremental costs . . . satisfy the section 3622(c)(2) requirement." Order No. 3506, at 35.
- Pro rata attribution is more complete and more accurate than the status quo, which systematically understates the costs of competitive products and inaccurately assigns incremental package costs to market dominant products.
- Our approach attributes variable costs caused by packages to individual products based on the workload they cause.

Long-Term Solutions Require Identifying *All* Incremental Costs of Competitive Products

1. Necessary to prevent cross-subsidization
2. Necessary to provide guideposts for effective cost attribution
3. Necessary to set a meaningful "appropriate share" of institutional costs to be covered by competitive products

Current models for estimating the incremental costs of delivering packages are inadequate.

1. Mathematical shortcuts *do not hold* at current package delivery volumes



- The Postal Service estimates incremental cost by using a constant elasticity model.
- This model *does not work* to estimate the incremental costs of package deliveries given the large volume of that business today.

The Commission Has Recognized the Problem: Using this approach for 39 U.S.C. 3633(a)(1)

eliminating small volume products. In that docket, however, the Commission noted that the proposed approach might overstate actual incremental costs, and noted that there may be bias in the results under certain circumstances.[8] With respect to the current proposal, because the volume of competitive products is a very small percentage of total Postal Service volume, the estimated incremental cost for all competitive products can be expected to be reasonably close to their actual incremental cost.[9] However, the risk of bias in the Postal Service's approach would increase as the volume eliminated becomes a higher percentage of the total volume.

For this reason, the Commission accepts Proposal Twenty-Two, but urges the Postal Service to continue its investigation of other approaches that can be expected to provide unbiased estimates of incremental costs when evaluated over wider volume ranges. One plausible alternative is to replace the generic, log-linear approach with the

Order No. 399, Dkt. No. RM2010-4 (Jan. 27, 2010), at 4.

The Commission Has Recognized This Problem

The above describes an idealized cost model of a multi-product firm. A real-world multi-product firm does not have the information necessary to define the entire cost function of each activity. The general assumption of a constant elasticity for the cost function is not supported because it has not experienced volume at all levels of the cost function. The reliability of modeled estimates of variability is highest for volume levels close to the observed data upon which the estimates are based. The constant elasticity assumption is unsupported when used for volume levels substantially outside the range of actual experience.

Order No. 3506, Dkt. No. RM2016-2 (Sept. 9, 2016), at 8.

shown that the approximation is acceptably accurate at the volume levels used to evaluate the underlying functions.[59]

However, it is not clear that the approximation is accurate at volumes which are very different from the levels at which the underlying functions are evaluated. For example, Dr. Neels's approach requires calculating inframarginal costs at near-zero volumes, and the property of the approximation at those extremely low volumes is unknown. Implicitly, Dr. Neels is assuming the approximation is acceptably accurate

Professor Bradley, Dkt. No. RM2016-2 (Jan. 27, 2016), at 38.

aggregate and micro cost surfaces (Baumol, Panzar, and Willig 1988). For example, the aggregate, enterprise cost function is often taken as well approximated by the simple, constant elasticity functional form, whose parameters have been taken from the micro-level relationships *evaluated at forecasted output levels*. As noted, this poses no problem for the calculation of marginal costs, but when calculating incremental costs, the enterprises costs must be evaluated at output levels which may be far removed from current or forecasted operations. Unless the micro-relationships have especially convenient simple forms, the elasticities used to parameterize the enterprise cost function will differ at differing output levels. This poses serious questions for the practical (and tractable) calculation of incremental costs using the functional approach: Should the calibrated enterprise cost function be

Michael D. Bradley, Jeff Colvin, & John C. Panzar, "Issues in Measuring Incremental Cost in a Multi-Function Enterprise," in *Managing Change in the Postal and Delivery Industries* 4 (Michael A. Crew & Paul R. Kleindorfer eds., 1997).

2. Models implausibly assume that Postal Service operations would remain unchanged without packages

- Postal Service models for estimating incremental costs assume that there would be ***no reconfiguration of existing operations*** if the Postal Service stopped delivering packages.
- This approach assumes that competitive products ***have no significant effect*** on the overall operations of the enterprise.
- This implausible assumption leads to implausible results:

Competitive Product Costing Summary, FY19

	$, billions
Sum of Product-Level Vol. Var. + Prod. Spec. Costs	15.51
Group Incremental Costs	15.96
% Difference	**2.9%**

This "No Reconfiguration" Assumption Is No Longer Tenable

already being provided. Computationally, it is much easier to actually calculate "decremental" costs by "removing" product A from the vector of products and recalculating total costs. Implicit in this calculation is the assumption that the costs of producing the other products are not affected by the addition of product A in ways not captured in the incremental cost calculation. This is witness Takis' "no reconfiguration assumption" presented in the last case.

The Commission noted that this assumption is quite reasonable for classes or groups of classes that do not make up an extremely large portion of the driver. However, as the Commission pointed out, when a single product or single combination of products that is being "removed" makes up an extremely large proportion of the components driver, then the "no reconfiguration" assumption is less palatable.

Testimony of Michael D. Bradley on Behalf of the U.S. Postal Service, Dkt. No. R2000-1 (Jan. 12, 2000), at 48.

Models Must Account for Costs That Would Not Exist If Package Delivery Did Not Exist

operations and in network air transportation. The Priority Mail distribution operations exist for the purpose of expediting the handling of Priority Mail. They can and do sort other classes of mail, but without Priority Mail, those classes would be sorted in other operations. Consequently, if the Postal Service decided not to provide Priority Mail, the institutional costs for these operations would not exist. These costs thus are part of Priority Mail's incremental cost.

Testimony of Michael D. Bradley on Behalf of the U.S. Postal Service, Dkt. No. R2000-1 (Jan. 12, 2000), at 34.

3. Models implausibly assume that package deliveries do not impact letter mail deliveries

Delivering packages raises costs ***overall*** and cannot be considered in isolation.

The Commission Should Conduct a Study to Identify the Full Set of Competitive Product Incremental Costs

- The Commission should conduct a study of what a Postal Service that delivered ***only the mail*** would look like.
  - The difference between these hypothetical costs and actual costs constitute the incremental costs of competitive products under (a)(1).
  - This study would complement the Commission's ongoing analysis of the **Universal Service Obligation**.
  - There is Commission precedent for such a study.

Postal Regulatory Commission

Request for Proposals

regulation and the costing to support it. Accordingly, there is a need for the following information:

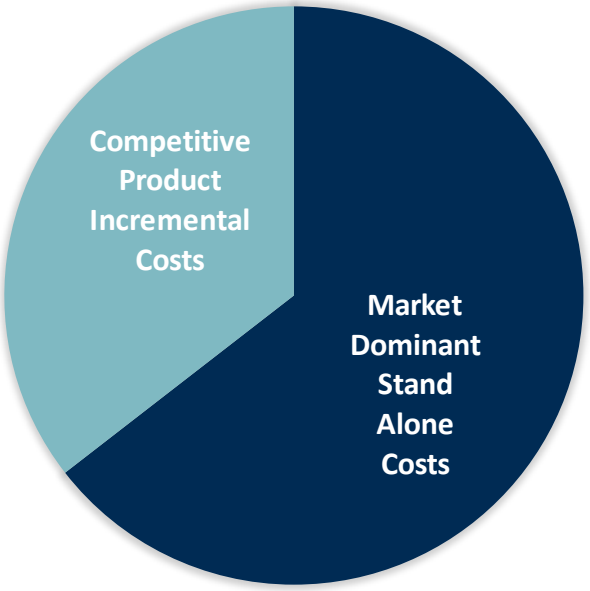
(1) A study of the role of infra-marginal costs in pricing and product costing

(2) Estimating infra-marginal costs for each product and the true fixed costs of the Postal Service

(3) Studying the aggregate ratio of volume variable to total accrued cost to determine why it appears to remain relatively constant overtime.

Analyze the Costs of a Stand-Alone Network

- Determine the costs associated with a **stand-alone network (SAN)** handling only market dominant products
- Calculations of stand-alone costs have long informed regulatory decisions by the Surface Transportation Board
- A SAN analysis can identify operational changes caused by competitive products.
- This model can be used to compute the ***incremental*** costs of the competitive products business



QUESTIONS?